

### Remarks

The above-referenced application has been reviewed in light of the Examiner's Office Action dated January 25, 2005. Claim 13 has been amended. Accordingly, Claims 1-20 are currently pending in this application. The Examiner's reconsideration of the rejections is respectfully requested, particularly in view of the above amendments and the following remarks.

In accordance with the Office Action, Claims 1, 2 and 5-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,852,487 to Fujimori et al. (the '487 patent or Fujimori) in view of U.S. Patent No. 6,339,462 B1 to Hasegawa et al (see O.A. at 2). It is believed that the Examiner intended to cite U.S. Patent No. 5,499,128 A to Hasegawa et al., since U.S. Patent No. 6,339,462 B1 was issued to Kishimoto et al. and was fully addressed in Applicants' prior response dated October 4, 2004. Applicants' respectfully traverse the present rejections, and submit that Fujimori in view of Hasegawa does not render Claims 1, 5, 10 and 12 obvious for at least the reasons set forth below.

Applicants' pending Claim 1 recites, *inter alia*, "A **touch sensor** type liquid crystal display comprising ... a plurality of columnar gap controlling spacers ... each of the spacers having two members ... **wherein a cross-section of each spacer ... is no larger in area than either of said first and second contact surfaces**". Thus, Claim 1 sets forth that the spacers are columnar, have two members, and that the cross-sectional area at the contact section between the spacer members is no larger than the contact area between either spacer member and its respective substrate.

The '487 patent to Fujimori et al. shows an LCD device with touch-sensor capability having a grid-like spacer 11 (see FIG. 2 of Fujimori). The Fujimori device has a number of separate liquid crystal regions 12 (see FIG. 1 of Fujimori) defined by the grid-like spacer 11. Such devices may exhibit disadvantages such as air pockets and/or increased labor requirements when injecting the separate<sup>7</sup>

regions with liquid crystal molecules. Thus, Fujimori is generally directed to a touch-sensing LCD, but fails to show columnar spacers, and particularly fails to teach or suggest columnar spacers “wherein a cross-section of each spacer ... is no larger in area than either of said first and second contact surfaces”, as recited in Claim 1. In addition, it is noted that the simple combination of any type of columnar spacers within the compartmentalized liquid crystal regions (e.g., 12 of FIG. 1) of Fujimori would necessarily result in an unworkable end product, as the liquid crystal regions of Fujimori are not contiguous.

The ‘128 patent to Hasegawa et al. shows an LCD device without any provision or support for a touch-sensor capability. Although Hasegawa may shown columnar spacers with relatively thin mid-sections, there is no teaching or suggestion that both contact surfaces have a contact area greater than the area at the midsection.

The Examiner relies on Hasegawa at col. 23, line 61 through col. 24, line 20, where Figure 12 is somewhat described, for the proposition that the cross-section of each spacer is no larger in area than either of the contact surfaces. This reliance on Hasegawa et al. is misplaced. Figures 10-11 of Hasegawa, as somewhat described at col. 22, line 65 through col. 23, line 60, and Figures 17-21 of Hasegawa, as somewhat described at col. col. 24, line 64 through col. 27, line 3, show a recessed portion (sometimes labeled 143) at the top contact surface of the spacers, which may include liquid crystal. The recessed portion is not consistently mentioned or labeled even in the views where it is clearly shown. The recessed portion causes a significant reduction in the **contact area**, even though the diameter of the top around the recessed portion may be wider than the midsection of the spacer.

The Examiner’s above-mentioned citation to Hasegawa at col. 23, line 61 through col. 24, line 20, indicates that “the columnar spacer was modified ... and ... comprises ... a resin layer ... formed on the center portion of the top surface of the columnar spacer 112 ... subjecting the spacer 112 to developing by using a

developing agent to each the edge portion of the surface and the side wall of the columnar spacer 112. The resin and the developing agent used in the fourth modification **similar to that used in the third modification** ... the thinnest portion noted above corresponds to L2.” The “third modification” refers to that of Figures 10 and 11, clearly having the unlabelled recessed portion. Thus, Applicants’ respectfully submit that even if the width of the midsection of Hasegawa’s spacer is thinner than the width of the top portion, Hasegawa actually teaches away from the contact area at said midsection being no greater than the contact area at the top portion by advocating a recessed portion that significantly reduces the contact area at the top portion (*see also, e.g.,* Hasegawa at col. 26, line 65 through col. 27, line 3).

In addition, Applicants’ columnar gap controlling spacers may be arranged to compensate for design and/or usage considerations by disposing a greater number of spacers towards the center of the touch-pad, for example (*see* Application at p. 10, line 18 through p. 11, line 10), as set forth in dependent claims. Fujimori et al. neither teach nor suggest such features, and teach away from such dispositions of spacers by showing a single fixed grid-like spacer. Thus, the showings of Fujimori et al. are inapposite to Applicants’ claimed feature of columnar spacers. Although Hasegawa may show columnar spacers, the spacers of Hasegawa are not disposed for placement in conjunction with a touch-pad.

The ‘128 patent to Hasegawa et al. shows an LCD device without any provision for touch-sensor capability. Applicants’ respectfully submit that the showings of Hasegawa with respect to spacers neither designed nor suggested for supporting the loads of touch-sensor usage would not be adopted by those of ordinary skill in the pertinent art for touch-sensor LCD devices. In addition, Hasegawa’s promotion of spacers having a reduced contact area at an upper surface, caused by a recess to promote light scattering, further teaches away from touch-sensor usage. Therefore, Hasegawa et al. fail to overcome the

deficiencies of Fujimori et al., at least with respect to a **“touch sensor type liquid crystal display”** with columnar spacers having “a cross-section of each spacer ... **no larger in area** than either of ... first and second contact surfaces”.

Thus, Applicants’ present disclosure recognizes the advantages of increased surface-contact area at each end of the spacer (see, e.g., p.7, l. 1-2 and l. 11-14; p. 9, l. 4-9; FIG. 12, 19a lower surface and 19b upper surface), and further recognizes the advantages of providing a necked-down interface between two spacer portions to enable the spacer to yield more in that region under the specific forces of touch-sensing (see, e.g., p. 7, l. 9-11 and l. 20-21; FIG. 12, interface between 19a and 19b), rather than at the spacer to substrate layer interface.

Therefore, it would not have been obvious to apply the showings of Hasegawa with respect to non-touch-sensing LCDs to those of Fujimori, and even if one did, it would not have resulted in the invention as presently set forth in Claim 1. Claims 1, 5, 10 and 12 recite similar limitations for “touch sensor” LCDs with columnar spacers having a “cross-section of each spacer ... no larger in area than either of ... first and second contact surfaces”, which are neither taught nor suggested by Fujimori in view of Hasegawa.

In accordance with the Office Action, Claims 13-18 stand rejected under 35 U.S.C. §103(a) as being obvious over Japanese Patent No. JP 2000-227596 to Yanagawa et al. (“Yanagawa”) in view of in view of U.S. Patent No. 5,499,128 A to Hasegawa et al., as discussed above. Applicants’ respectfully submit that Yanagawa in view of Hasegawa does not render amended Claim 13 obvious for at least the reasons set forth below.

Amended Claim 13 recites, *inter alia*, “A touch sensor type liquid crystal display comprising ... gap controlling spacers ... having two members ..., the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces”.


As discussed above with respect to Claim 1, the '128 patent to Hasegawa et al. shows an LCD device with recessed spacers, and fails to teach or suggest "cross-section of each spacer ... no larger in area than either of ... first and second contact surfaces". Yanagawa also fails to show columnar two-member spacers, and particularly not with the recited cross-section limitation relative to both contact surface. Accordingly, the '128 patent to Hasegawa et al. fails to overcome this and other deficiencies of Japanese Patent No. JP 2000-227596 to Yanagawa et al. In addition, amended Claim 13 now recites "touch sensor type", which both Yanagawa and Hasegawa fail to teach or suggest.

Conclusion:

Accordingly, it is respectfully submitted that independent Claims 1, 5, 10 and 12-13 are in condition for allowance for at least the reasons stated above. Since Claims 2-4, 6-9, 11 and 14-20 each depend from one of the above claims and necessarily include each of the elements and limitations thereof, it is respectfully submitted that these claims are also in condition for allowance for at least the reasons stated, and for reciting additional patentable subject matter. Thus, each of Claims 1-20 is in condition for allowance. All issues raised by the Examiner having been addressed, reconsideration of the rejections and an early and favorable allowance of this case is earnestly solicited.

Respectfully submitted,

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